REMARKS

Reconsideration of this application as amended is respectfully requested.

The Office Action mailed May 22, 2003 states that claims 1-4 are pending and that claims 1-4 are rejected.

It thus appears that the Examiner is not aware of the Preliminary Amendment that the attorney for applicants mailed to the Patent and Trademark Office on December 28, 2001. Accompanying this Amendment is therefore a document entitled Submission of Duplicates with Proof of Prior Timely Filing that requests that the December 28, 2001 Preliminary Amendment be accorded the December 28, 2001 date on its Certificate of Mailing.

Assuming entry of claims 5-44 found in the December 28, 2001 Preliminary Amendment, then claims 1-44 would have been pending at the time of the Office Action.

In view of the Office Action of May 22, 2003, claims 1-4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over applicants' alleged admitted prior art ("AAPA") in view of U.S. Patent No. 6,477,144 B1 of Morris et al. ("Morris").

Applicants have amended the specification to correct typographical errors. Applicants respectfully submit that the amendments to the specification do not add new matter.

Claims 1-4 have been canceled without prejudice. Claims 5-44 have been amended. New claims 45-48 have been added. Support for the amendments and the new claims is found in the specification as originally filed. Applicants respectfully

submit that the amendments and the new claims do not add new matter. Applicants reserve all rights with respect to the applicability of the doctrine of equivalents.

In rejecting claims 1-4 under 35 U.S.C. § 103(a), the Examiner has stated the following:

> AAPA teaches an apparatus (fig. 1A), comprising nodes (fig 1A box 101a, 105) that process data having a data rate corresponding to the highest speed managed by the node (fig. 1A OC-12).
>
> AAPA is silent on the nodes having a scheduling cycle, the scheduling cycle partitioned into amounts of data such that one of the partitioned amounts of data serviced by the scheduling cycle corresponds to a data rate that corresponds to a highest speed grade managed by the node, as specified in claims 1-4; and on the use of circular linked lists, as specified in claims 3-4.
>
> Morris teaches a node having a scheduling cycle (fig. 6 box 62), as specified in claims 1-4; for determining a scheduling cycle, the scheduling cycle partitioned into amounts of data such that one of the partitioned amounts of data serviced by the scheduling cycle corresponds to a data rate that corresponds to a highest speed grade managed by the node (fig. 6: Class a, col. 3 line 58 – col. 4 line 2), as specified in claims 1-4; the node has a memory/array (col. 8 lines 13-20) that maintains a data entry for each user / class (col. 78 lines 1-11) managed by the node, as specified in claims 3 and 4; the memory having a circular linked list user managed by the node, the memory having a circular link list for each speed grade / class managed by the node where each of the circular linked lists circularly links those of the users who receive service at the same speed grade / class (col. 8 lines 13-20), as specified in claims 3 and 4; and the first data entry having a first data element that points to a next data entry within the first data entry's circular linked list (head, pointer, col. 8 lines 13-20), as specified in claim 4.
>
> Therefore it would have been obvious to one of ordinary skill in the art, having both AAPA and Morris before him/her and with the teachings [a] as shown by AAPA, as apparatus, comprising nodes that process data having a data rate corresponding to the highest speed managed by the node, and [b] as shown by

> Morris, a means for processing data arriving at a node where the data belong to different classes with different data rates, to be motivated to modify the system of AAPA by inserting the data rate scheduler of Morris at each of the nodes of AAPA (AAPA: fig. 1A). This would improve the system by providing an algorithm that takes into account both class priority and delay times when scheduling data.

(5/22/03 Office Action pp. 2-4).

Claims 1-4 have been canceled without prejudice.

Applicants respectfully submit that amended claim 5 is not obvious under 35 U.S.C. § 103(a) in view of AAPA and Morris.

The background discussion of the specification of the present application that comprises AAPA includes a disclosure of the following:

> **[0004]**Figure 1a attempts to show a wide range of different users being serviced by access node 101a. Note that, as an example, access node 101a has four OC-12 network lines 102a, 104a, 115a, 117a. Each OC-12 network line corresponds to a 622 Mb/s line. The traffic carried by these network lines 102a, 104a, 115a, 117a may be reduced to varying degrees of granularity depending on the users the access node 101a is configured to provide access for.
> **[0005]**For example, in the exemplary deployment of Figure 1a, network line 117a corresponds to traffic being delivered to a single user. As such, the user coupled to network line 117a consumes 622Mb/s worth of traffic. By contrast, note that network line 102a provides service for three hundred and thirty six different users. That is, multiplexer 103 reduces the 622Mb/s network line 102a into three hundred and thirty six individual DS1 lines 106_1 through 106_{336} that each provide 1.522Mb/s worth of service to a different user.

(AAPA specification p.2, line 19, to p. 3, line 10).

Morris includes a disclosure of a scheme for scheduling packet traffic in which classes in the same timeslot are linked in a table. Morris discloses that Tnext is the next time that a class is to be serviced by a scheduler (Morris Fig. 9). Morris discloses that Tupdate is the interval between consecutive rate-based servicing of a class (Morris Fig. 9).

Morris includes a disclosure of the following:

> FIG.**11** shows graphically the linked data structure of traffic classes which are being processed according to the functional block diagram shown in FIG. **10**. Referring to FIGS. **10** and **11**, there are three linked lists existing from the previous timeslot. The reference counter for present output is a timeslot **1**. The list at timeslot **1** consists of classes e, b, h, and k. Class e is removed from the head of the list and served. The remaining classes b, h, and k, are due for service but won't receive it during this timeslot, so they are unlinked from the current timeslot and linked at the head of the next timeslot list. The result is that classes e, b, h, and k are served during timeslots **1**, **2**, **3**, and **4**, respectively. The next list starts at timeslot **5** which includes classes a, c, g and f.
>
> When a cell arrives the class is examined and the class is appended to the end of the appropriate timeslot if the class is not already on the list. In other words, linked lists of classes 112 are created among those classes which have a Tnext of the same timeslot. Those classes in a linked list belong to the same timeslot and are linked in the timeslot array 114. The reference counter 116 increments at each timeslot and when it reaches a timeslot, the first class linked in that timeslot is issued, and the others are prefixed to the list of the next timeslot. The timeslot array kept tracks of the head and tail of each timeslot's linked list.
>
> As each class is pulled of the list, the next timeslot for that class is computed and the class is linked at the tail of the list associated with the next timeslot. This process accepts a parameter called called delay variation tolerance (CDVT) which is

intended to allow a controlled amount of jitter in the class's cell stream. The benefit of allowing some jitter is that it allows a class that has "fallen behind" in service due to contention with other classes a chance to "catch up" and achieve its desired rate. The benefit of preventing too much jitter is that the class's cell stream can be guaranteed to confirm to an ATM connection traffic descriptor that includes sufficient CDVT.

In this embodiment, therefore, the scheduler updates Tnext by first advancing it to the current time if Tnext is in the past. The scheduler then increments Tnext by Tupdate, and attempts to schedule the class for timeslot Tnext-CDVT. In other words, the class is allowed to be served as much as CDVT earlier than it's theoretical service time.

(Morris Col. 5, line 59, to Col. 6, line 34).

Morris also includes a disclosure of a known time scan approach not involving a linked list. Morris includes the following disclosure:

By referring to FIG. 6, the operation of a known rate based scheduler is described. In this scheduler, all the traffic classes are scanned in every cell interval (timeslot). It should be noted that it is assumed the cell interval corresponds to a timeslot in the following description. As will be described later in connection with further embodiments, they can be different from one another. This scheme therefore can be conveniently called the time scan approach. Cells which have arriaved are buffered in respective queues 60 according to their traffic class. The rate scheduler 62 of this scheme includes a scheduling table 64 which hold fields called Tnext and Tupdate for each traffic class. A cell reference counter 66 increments once per cell interval (timeslot) during which interval a scanner 68 scans through Tnext field of the scheduling table to decides which class is to be serviced. Tnext is the next timeslot a cell is to go out. The scanner and the reference counter are compared at a comparator 70 and when one of the classes has a Tnext less than or equal to the reference counter, that class is selected and a cell is sent out to the link. The Tnext is updated at a gate 72 by adding the Tnext and a Tupdate value found in the Tupdate field

> for that class. The Tupdate value indicates the time interval (thenumber of timeslots) between consecutive cells of the same class. In other words this value corresponds to the rate allocated to that class. When the class usage changes (e.g. a switched virtual circuit is added/deleted to the class), the Tupdate is modified to reflect the change.

It is respectfully submitted that the AAPA does not teach or suggest a combination with Morris and Morris does not teach or suggest a combination with the AAPA. It would be impermissible hindsight, based on applicants' own disclosure, to combine the AAPA with Morris.

Even if the AAPA and Morris were combined, such a combination would lack the following limitations of amended claim 5:

> wherein each of the scheduling cycles is divided into equal amounts of data, wherein each of the speed grades has a respective bandwidth allocation associated with a respective length of time, wherein the length of time is one of the scheduling cycles for the bandwidth allocation for the highest speed grade, wherein the length of time is more than one of the scheduling cycles for each bandwidth allocation for the lower speed grades, wherein the lower speed grades and the highest speed grade are serviced by the node.

(Amended claim 5).

Given that amended claims 6-15 are dependent claims with respect to amended claim 5, either directly or indirectly, and add additional limitations, applicants submit that amended claims 6-15 are not obvious under 35 U.S.C. § 103(a) in view of AAPA and Morris.

Applicants respectfully submit that amended Claim 16 is not obvious under 35 U.S.C. §103(a) in view of AAPA and Morris.

As discussed above, it is respectfully submitted that the AAPA does not teach or suggest a combination with Morris and Morris does not teach or suggest a combination with the AAPA. It would be impermissible hindsight, based on applicant's own disclosure, to combine the AAPA with Morris.

Furthermore, even if the AAPA and Morris were combined, such a combination would lack the following limitations of amended claim 16:

> dividing each of the scheduling cycles into equal amounts of data;
>
> providing each of the speed grades with a respective bandwidth allocation associated with a respective length of time,
>
> wherein each bandwidth allotment is provided one of the amounts of data per unit of time, wherein the length of time is one of the scheduling cycles for the bandwidth allocation for the highest speed grade, wherein the length of time is more than one of the scheduling cycles for each bandwidth allocation for the lower speed grades, wherein the lower speed grades and the highest speed grade are serviced.

(Amended claim 16).

Given that amended 17-23 are dependent claims with respect to amended claim 16, either directly or indirectly, and add additional limitations, applicants submit that amended claims 17-23 are not obvious under 35 U.S.C. § 103(a) in view of AAPA and Morris.

Applicants respectfully submit that amended Claim 24 is not obvious under 35 U.S.C. § 103(a) in view of AAPA and Morris.

As discussed above, it is respectfully submitted that the AAPA does not teach or suggest a combination with Morris and Morris does not teach or suggest a combination with the AAPA. It would be impermissible hindsight, based on applicants' own disclosure, to combine the AAPA with Morris.

Furthermore, even if the AAPA and Morris were combined, such a combination would lack the following limitations of amended claim 24:

> wherein each of a series of scheduling cycles is partitioned into equal amounts of data, wherein one of the amounts of data per scheduling cycle corresponds to a highest data rate of the plurality of data rates, wherein each of the one or more ports triggers a release from the buffer memory of one of the amounts of data worth of its identified packets in response to reception of a release signal derived from the series of scheduling cycles, and wherein releases from a same port are separated in time so that a data rate of that same port is realized.

(Amended claim 24).

Given that amended 25-35 are dependent claims with respect to amended claim 24, either directly or indirectly, and add additional limitations, applicants submit that amended claims 25-35 are not obvious under 35 U.S.C. § 103(a) in view of AAPA and Morris.

Applicants respectfully submit that amended claim 36 is not obvious under 35 U.S.C. § 103(a) in view of AAPA and Morris.

As discussed above, it is respectfully submitted that the AAPA does not teach or suggest a combination with Morris and Morris does not teach or suggest a combination with the AAPA. It would be impermissible hindsight, based on applicants' own disclosure, to combine the AAPA with Morris.

Furthermore, even if the AAPA and Morris were combined, such a combination would lack the following limitations of amended claim 36:

> distributing to each of one or more highest speed grade ports, while counting, permission to release one of equal amounts of data; and
> distributing to each of one or more lower speed grade ports, while continuing the counting, permission

to release one of the equal amounts of data until the counting has counted across a counting modulo, wherein each of the lower speed grade ports consumes less bandwidth than each of the one or more highest speed grade ports, the counting modulo establishing a temporal width of the scheduling cycle that results in one of the equal amounts of data per scheduling cycle being the amount of bandwidth allocated to each of the one or more highest speed grade ports.

(Amended claim 36).

Given that amended 37-44 are dependent claims with respect to amended claim 36, either directly or indirectly, and add additional limitations, applicants submit that amended claims 37-44 are not obvious under 35 U.S.C. § 103(a) in view of AAPA and Morris.

Applicants respectfully submit that new claim 45 is not obvious under 35 U.S.C. § 103(a) in view of AAPA and Morris.

As discussed above, it is respectfully submitted that the AAPA does not teach or suggest a combination with Morris and Morris does not teach or suggest a combination with the AAPA. It would be impermissible hindsight, based on applicants' own disclosure, to combine the AAPA with Morris.

Furthermore, even if the AAPA and Morris were combined, such a combination would lack the following limitations of new claim 45:

(a) setting an active speed grade to a highest speed grade;
(b) servicing as much as possible of a servicing circle of the active speed grade until a count for the highest speed grade has timed out;
(c) if the servicing circle of the active speed grade has been fully serviced and the count for the highest speed grade has not timed out, then setting the active speed grade to a lower speed grade that is a highest speed grade having a servicing circle that

has not been fully serviced and going to operation (b) and repeating;

(d) if the count for the highest speed grade has timed out, then setting the active speed grade to the highest speed grade that has not timed out and going to operation (b) and repeating.

(New claim 45).

Given that new 46-48 are dependent claims with respect to new claim 45 and add additional limitations, applicants submit that new claims 46-48 are not obvious under 35 U.S.C. § 103(a) in view of AAPA and Morris.

Applicants therefore respectfully submit that the rejections and objections have been overcome.

If there are any charges not covered by any check submitted, please charge Deposit Account No. 02-2666.

Respectfully submitted,

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